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antecedent to vol. xii. are very few in number. There is, however, a considerable mass of odd numbers, and it is very desirable that these should find their proper places as far as may be, and as soon.

Comet-Circular received from Dr. Petersen.

"On the night of the 27th of June last, Dr. D'Arrest, of the Leipsic Observatory, discovered a very faint comet in the constellation *Pisces*. The apparent place could only be estimated very approximately on account of the twilight which shortly after ensued.

1851.	Leipsic M.T.	R.A.	Decl.
	h m	° ′	° ′
June 27	13 10	7 49	+10 32

This may be a few minutes in error.

"Next night was cloudy, and the comet invisible; but the night after proved more favourable, and Dr. D'Arrest obtained two comparisons with Weisse $0^{h}\cdot 690$, which he considers as accurate as can be fairly expected considering the extreme faintness of the comet.

1851.	Leipsic M.T.	R.A.	Decl.
	h m s	° ′ ″	° ′ ″
June 29	13 14 5	10 4 47	+10 37 35

The comet has also been observed at Berlin and South Villa.

	1851.	h m s		R.A.	Decl.
				° ′ ″	° ′ ″
BERLIN,	July 1	13 21 29	Berlin M.T.	12 18 40·3	+10 40 28·5
SOUTH VILLA,	4	13 4 59	Green. M.T.	15 37 32·0	+10 48 20·0

Elements. By MM. G. Rümker and E. Vogel.

Perihelion Passage, 1851, July 6·14735, Berlin M.T.

	° ′ ″	
Long. of Perihelion ...	324 19 44	App. Equinox, 1851, July 6.
— Node	152 40 44	
Inclination	14 39 36	

Log. Perihelion Distance (log. *q*) 0·089026. Motion direct.

IRENE.

On the Discovery of a Fourth New Planet, at Mr. Bishop's Observatory, Regent's Park. By Mr. Hind.

"At $12^h\ 45^m$ mean time, on the night of the 19th of May, 1851, during an examination of the heavens near the star Lalande 29490, I remarked an object of very nearly the same degree of brightness, following the star $8^s\cdot 5$ in right ascension, and about $2'\frac{1}{2}$ to the *south*. I had previously (in 1850) had my attention directed to a star of the 9·10th magnitude, which follows Lalande's about 10^s,

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and 2′ to the *north*, and consequently was pretty well convinced that no star of the 9th magnitude then occupied the position of the stranger, as it could not have been overlooked; the region of the heavens in the 16th hour of right ascension, and between 10° and 15° south of the equator, is one with which I am very closely acquainted, and to this familiarity with the telescopic stars gained by repeated examinations in 1847, I must attribute the discovery of a fourth planet, as I have before had occasion to attribute to it the detection of the new star in *Ophiuchus*, found on the 27th of April, 1848.

" The low power which was on the telescope at the time was immediately changed for the wire-micrometer, and comparisons of the suspicious object with Lalande's star were commenced at $12^h\ 51^m\ 54^s$ mean time, when the difference of right ascension was $8^s{\cdot}3$. At $13^h\ 4^m\ 53^s$ mean time, the difference was found to be $7^s{\cdot}7$, a change quite great enough to be beyond doubt, and from this time numerous differential observations were taken with the view of ascertaining the direction of the planet's motion, for of the planetary nature of the newly-discovered object I was now convinced.

" A mean of the whole gave for $13^h\ 9^m\ 30^s$ Greenwich time,—

Right ascension of planet greater than that of star.... $7^s{\cdot}52$
Right ascension of planet south of the star ....2′ 36″·1*

" On the night of the discovery it was remarked that there was a decided contrast between the light of the star and that of the planet; the former was very white and vivid, while the latter had a dull bluish tinge. The planet also appeared to be enveloped in an extremely faint nebulous atmosphere, the existence of which has been confirmed on several subsequent occasions, though it requires a perfectly clear night and great attention to render it very evident.

" Sir John Herschel, who kindly undertook the selection of a name for this, the fourteenth member of the ultra-zodiacal group, has suggested *Irene* as one suitable to the present time, the symbol to be a dove carrying an olive-branch with a star on the head; and since the announcement of this name, I have been gratified in receiving from all quarters the most unqualified expressions of approbation.

" There is one remarkable circumstance in the history of the discovery of *Irene*, which shows how closely the heavens are now examined, and how observers at distant stations, and without any

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* Mr. Main, in the absence of the Astronomer Royal, has been good enough to send me the following places of Lalande 29490.

" The mean place of Lalande 29490, with which star Mr. Hind first compared the planet, is as follows, from five observations:—

	R.A.	N.P.D.
	h m s	° ′ ″
1851·0	16 4 0·51	103 20 56·4

" The Apparent Place on May 19 is

R.A.	N.P.D.
h m s	° ′ ″
16 4 2·10	103 20 56·9

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communication with each other, are guided by experience into the same methods for prosecuting a search for planets. I allude to the independent discovery of the new planet by Dr. De Gasparis at the Royal Observatory of Naples, only *four days after my own*, intelligence of which reached London on the morning of Wednesday last, the 11th of June.

"The elements of *Irene* have been calculated by MM. Vogel and George Rümker, and their orbit represents the observed places up to June 10 with great accuracy. It places *Irene* between *Parthenope* and *Egeria* in order of mean distance from the sun, the period of revolution being 1490 days, or 4·08 years. The positions of the lines of nodes and apsides, and of the plane of the orbit, agree nearly with those of the orbit of *Ceres*.

"It is worthy of notice that a star of the 9th magnitude, observed by Bessel in zone 249, right ascension (1825), $16^h\,4^m\,21^s{\cdot}81$, north polar distance = $104^\circ\,32'\,26''{\cdot}9$ has disappeared from its place, which is little more than 1° distant from the position occupied by *Irene* at the time of her discovery. Unless, however, the period of revolution assigned to this planet by MM. Vogel and Rümker admits of a large correction (which at present seems improbable), I think the object observed by Bessel, though in all probability a planet, was not the one just brought to light. A month or six weeks' longer observation of *Irene* may furnish elements which will enable us to decide this point."

Observations.

LIVERPOOL. Equatoreal. (Mr. Hartnup.)

	Greenwich M.T.	R.A.	Log $\frac{p}{P}$	N.P.D.	Log $\frac{q}{P}$	Star of Comp.
1851.	h m s	h m s		° ′ ″		
June 10	12 34 40·4	15 43 42·60	+8·292	104 12 21·3	−9·9559	γ Libræ
	12 58 36·8	41·86	+8·367	23·2	·9520	—
	13 32 33·2	40·90	+8·426	28·5	·9475	—
15	10 29 46·2	15 40 14·12	+7·333	104 28 10·2	·9651	—
	10 54 42·5	13·56	+7·820	13·7	·9642	—
	11 19 38·4	12·79	+8·041	16·6	·9628	—
16	9 55 17·2	15 39 37·18	−7·509	104 31 31·7	·9652	—
	10 20 13·1	36·24	+7·099	35·7	·9653	—
	10 45 9·2	35·65	+7·758	39·4	·9648	—
17	10 11 42·0	15 38 60·00	+6·731	104 35 6·7	·9656	—
	11 1 34·2	58·66	+7·975	14·4	·9636	—
July 16	9 55 10·3	15 33 41·92	+8·269	106 46 0·1	·9634	B.A.C.5257
	10 37 5·8	42·08	+8·398	7·8	·9556	—
17	9 59 27·7	15 33 56·47	+8·298	106 51 20·6	·9624	—
	10 19 25·3	56·43	+8·361	23·7	·9587	—
18	10 19 46·1	15 34 12·82	+8·373	106 56 47·2	·9580	—
	10 39 44·5	13·16	+8·423	47·8	·9536	—
21	10 12 55·2	15 35 11·14	+8·381	107 13 8·0	·9581	—
	10 32 53·9	11·46	+8·430	13·2	−9·9536	—

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The observations are corrected for refraction. The corrections to be applied for parallax in time and arc are represented by p and q. P is the equatoreal horizontal parallax.

The following are the assumed *mean* places of the stars of comparison for 1851·0, derived from the Greenwich 12-year Catalogue:—

	R.A. h m s	N.P.D. ° ′ ″
γ Libræ	15 27 11·83	104 17 19·49
B.A.C. 5257	15 45 20·87	106 17 15·98

GREENWICH. Meridian Circle. (The Astronomer Royal.)

1851.	Green. M.T. h m s	R.A. h m s	N.P.D. ° ′ ″
May 28	11 31 38·3	15 55 15·16	103 39 10·0
29	26 44·2	54 16·87	41 15·0
30	21 51·2	53 19·64	43 23·0
31	16 58·6	52 22·77	45 39·5
June 2	11 7 15·8	50 31·44	50 23·9
4	10 57 36·6	48 43·85	103 55 20·9
16	10 1 20·3	39 36·92	104 31 33·4
17	9 56 47·9	39 0·41	35 3·1
19	9 47 47·9	15 37 52·02	104 42 13·0

Not corrected for parallax.

DURHAM. Fraunhofer Equatoreal. (Mr. R. C. Carrington.)

851.	Greenwich M.T. h m s	App. R.A. h m s	Log $\frac{p}{P}$	App. N.P.D. ° ′ ″	Log $\frac{q}{P}$	No. of Comps. in R.A.	No. of Comps. in N.P.D.	Set.
ne 10	12 11 41·1	15 43 43·32	+8·210	104 12 13·3	−9·9628	24	8	11
12	12 10 4·4	42 14·37	·240	18 31·7	·9624	12	4	12
15	11 11 19·7	40 13·14	·005	28 18·5	·9672	7	7	13
	12 16 44·9	11·33	·315	23·6	·9594	18	6	14
16	11 25 10·6	39 34·53	·123	31 42·9	·9656	24	8	15
17	11 51 12·0	38 57·35	·258	104 35 18·0	·9622	12	4	16
26	11 41 29·8	34 43·54	·354	105 10 16·4	·9588	24	8	17
	12 6 5·9	42·86	·415	18·6	·9540	23	8	18
28	11 42 53·3	34 5·63	·382	18 46·6	·9573	8	4	19
29	11 20 51·8	33 49·46	·332	23 5·3	·9607	20	7	20
	11 48 24·3	49·32	·405	12·2	·9554	12	6	21
30	11 19 46·9	33 35·04	·343	27 31·5	·9601	23	8	22
y 4	11 22 0·8	15 32 54·97	+8·393	105 45 56·4	−9·9573	17	6	23

P is the equatoreal horizontal parallax in seconds of arc; p and q are the required corrections in time and arc respectively.

Mean Places of Stars of Comparison, 1851·0.

Name.		R.A. h m s	N.P.D. ° ′ ″	Set.
Weisse, xv^h,	864	15 44 56·62	104 15 51·5	11, 12
—	838	43 16·56	24 31·5	13
B.A.C.	5188	35 4·00	104 33 40·0	14, 15, 16
Weisse, xv^h,	644	33 40·03	105 5 5·7	17
B.A.C.	5190	35 41·85	11 39·0	18, 19, 20
—	5184	15 34 23·60	105 31 57·7	21, 22, 23

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June 12. Sky clear for a very short time.
15, 16. High wind. The hearing tube used on the 15th.
17. Much interrupted by cloud.
28, 29. Planet very faint.
July 4. No choice of stars. Diff. of N.P.D. large.
5 to 14. Continued cloudy weather. Obs. discontinued.

COLLEGIO ROMANO. Meridian Circle. (Father Secchi.)

1851.	Rome M.T.	App. R.A.	App. Decl.
	h m s	h m s	° ′ ″
May 29	11 26 54·4	15 54 18·93	−13 41 17·8
30	22 1·5	53 21·77	43 20·3
31	17 8·9	52 24·89	45 38·5
June 1	12 17·0	51 28·77	47 56·1
2	7 26·3	50 33·77	50 19·8
3	11 2 36·4	49 39·72	52 44·3
5	10 52 58·8	47 53·60	13 57 48·2
6	10 48 15·6	15 47 1·88	−14 0 36·3

Micrometrical Observations.

1851.	Rome M.T.	R.A. Planet.	Decl. Planet.		Obs.	Microm.
	h m s	m s	′ ″			
May 31	11 39 7·7	=* +2 31·7	=* −5 3·4	48 Libræ	3	Circ.
June 1	9 15 14·8	+1 41·5		— —	3	Circ.
	11 40 17·8	+1 35·08	−2 43·7	— —	4	Wire
2	9 21 16·2	+0 44·78	−0 36·1	— —	5	Circ.
	9 53 54·8	+0 43·50	−0 33·3	— —	3	Wire
	11 34 55·4	+0 39·27	−0 23·3	— —	4	Wire
3	9 34 29·8	−0 10·39	+1 42·6	— —	3	Circ.
	11 52 44·7		+1 52·8	— —	4	Wire
	11 54 39·6	−0 15·53		— —	4	Wire
5	9 35 41·3		* +0 17·3	H.C. 28969	3	Wire
	9 54 31·2	+0 0·2		— —	4	Circ.
	10 52 58·8	−0 2·7		— —		Mer. Passage

HAMBURG. (M. C. Rümker.)

1851.	Hamburg M.T.	R.A.	Decl.	
	h m s	° ′ ″	° ′ ″	
June 4	10 22 43·5	237 10 45·8	−13 56 32·8	Equatoreal
	10 57 42·0	41·4	41·6	Merid. Circle
18	10 52 0·2	234 36 14·2	14 38 45·3	Equatoreal
19	10 47 29·9	27 59·5	42 23·0	—
21	10 40 46·5	234 12 27·8	14 49 52·3	—
28	11 34 57·4	233 31 33·8	15 18 48·1	—
29	11 13 52·6	27 35·9	22 54·3	—
30	10 58 51·8	23 58·4	27 17·7	—
July 1	10 57 56·6	20 46·1	31 42·3	—
2	10 53 24·8	18 4·8	36 22·1	—
3	11 23 22·7	233 15 51·3	−15 40 53·8	—

Not corrected for parallax.

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HAVERHILL. (Mr. W. Boreham.)

1851.	Greenwich M.T. h m s	R.A. h m s	s	N.P.D. ° ′ ″	″	No. of Obs.	Star of Comp.
May 21	11 0 2	16 2 14·89	−0·012 P	103 26 25·6	−0·904 P	6	*a*
22	11 6 40	1 14·25	·012	28 1·1	·903	6	*a*
23	10 33 51	16 0 16·60	·015	29 41·2	·903	7	*b*
28	11 15 39	15 55 16·33	·003	39 10·8	·911	5	*b*
30	11 16 28	53 19·59	·000	43 21·8	·912	3	*c*
31	10 21 14	52 25·22	·009	45 32·9	·908	6	*c*
June 1	10 31 25	51 28·14	·006	47 52·3	·911	5	*c*
4	10 28 31	48 45·00	−0·005	103 55 16·0	·912	6	*c*
16	11 55 2	39 34·33	+0·020	104 31 44·8	.898	5	*d*
17	11 33 46	38 57·28	·017	35 8·0	·904	5	*e*
19	10 31 36	37 50·65	·009	42 26·3	·916	3	*f*
21	10 47 27	36 48·81	·012	49 57·5	·913	5	*f*
22	10 26 30	36 20·62	·009	104 53 46·1	·916	6	*f*
24	10 37 42	35 28·51	·013	105 1 47·0	·914	5	*g*
26	10 20 36	15 34 44·09	+0·012 *p*	105 9 59·1	−0·916 *p*	6	*g*

P = horizontal equatoreal parallax in arc.

	Mean Places, 1851·0. R.A. h m s	N.P.D. ° ′ ″
a = Weisse xvi^h, 38	16 2 43·22	103 35 54·3
b = — xv^h, 1118	15 58 46·02	40 0·5
c = Greenwich 12-year Catalogue, 1308	49 51·10	103 50 43·2
d = Weisse xv^h, 744	38 44·80	104 46 7·6
e = — — 705	36 37·41	41 56·6
f = Greenwich 12-year, No. 1282 = B.A.C. 5188	35 3·95	104 33 39·7
g = — — — 1283 = — 5190	15 35 41·86	105 11 38·8

Elements.

Calculated by M. Fergola, of the Royal Observatory, Naples.

Epoch 1851, June 1·0, Greenwich M.T.

	° ′ ″	
Mean Anomaly	44 5 32·3	
ϖ	185 27 33·4	Mean Equinox of Epoch.
☊	87 16 29·6	
i	8 52 28·6	
φ	8 50 10·5	
Log *a*	0·4078482	
μ	867″·4298	

The elements are based upon Mr. Hind's observation of May 19, and the Neapolitan observations of May 25 and June 3.